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| EXAMINER | |
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| LUU, CHUONG A | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. 10/787,120 | Applicant(s) TANAKA ET AL. | |
|---|---|---|---|
| | Examiner Chuong A. Luu | Art Unit 2892 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _03_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on _August 22, 2008_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) _7,8,10-13 and 15-24_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _7,8,10-13 and 15-24_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _8/22/2008_.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Arguments*

Applicant's arguments with respect to claims 7-8, 10-13 and 15-24 have been considered but are moot in view of the new ground(s) of rejection.

### *Request For Continued Examination (RCE)*

The request filed on August 22, 2008 for a Request For Continued Examination (RCE) under 37 CFR 1.53(d) based on parent Application No. 10/787120 is acceptable and a RCE has been established. An action on the RCE follows.

## WITHDRAWN

The indicated allowability of claims 7-8, 10-13 and 15-24 is withdrawn in view of the newly discovered reference(s) to Ogawa et al. (U.S. 6,884,699), Tanabe et al. (U.S. 6,861,614) and Takami (U.S. 7,102,750). Rejections based on the newly cited reference(s) follow.

## REJECTIONS NOT BASED UPON PRIOR ART

### Statutory Basis

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 18-21 and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claims 18 and 19, line 10, it is unclear whether the "first laser beam is melt". It appears from the applicant's specification (i.e. paragraph [0080]) that this is the case, a semiconductor film is irradiated to a region melted by the long beam 305. Correction is required.

## PRIOR ART REJECTIONS

### Statutory Basis

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

### The Rejections

Claims 7-8, 10, 12-13, 15, 17 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogawa et al. (U.S. 6,884,699) in view of Tanabe et al. (U.S. 6,861,614).

Ogawa discloses a method for making a polycrystalline silicon film with

**(7); (8)** shaping a first laser beam having a wavelength not longer than that of visible light into an beam on a surface to be irradiated, wherein said laser beam is a of a solid laser;

irradiating the surface with the elongated beam wherein an irradiation area of the beam has at least a first portion and a second portion, said first portion having a lower energy density than the second portion;

irradiating the surface with a second laser beam concurrently with the elongated beam, said second laser beam having a fundamental wave emitted from a solid laser, in such a manner that an irradiation area of the second laser beam overlaps at least the first portion of the irradiation area of the beam while moving the surface relatively to the beam and the second laser beam in a first direction (see column 7, line 35 through column 13, line 25. Figures 1-5);

**(10); (15); (20)** wherein each of the first laser beam and the second laser beam is emitted from one selected from the group consisting of a YAG laser (see column 7, lines 66-67);

**(12); (13)** forming a non-single crystalline semiconductor film over a substrate;

shaping a first laser beam emitted from a first laser oscillator into an beam on a surface to be irradiated wherein the first laser beam has a wavelength not longer than that of visible light, wherein said laser beam is a of a solid laser;

irradiating the non-single crystalline semiconductor film with the beam wherein an irradiation area of the elongated beam has at least a first portion and a

second portion, said first portion having a lower energy density than the second portion, wherein a portion of the non-single crystalline semiconductor film irradiated with the first laser beam is melted;

irradiating at least said portion of the non-single crystalline semiconductor film with a second laser beam emitted from a second laser oscillator, said second laser beam having a fundamental wave emitted from a solid laser, wherein the irradiation of said portion of the non-single crystalline semiconductor film with the second laser beam is performed when said portion is in a molten state due to the irradiation of said first laser beam, and an irradiation area of the second laser beam overlaps at least the first portion of the irradiation area of the elongated beam;

moving the substrate relatively to the elongated beam and the second laser beam in a first direction, thereby, forming a crystal grain region in the non-single crystalline semiconductor film;

moving the substrate in a second direction relatively to the elongated beam and the second laser beam (see column 7, line 35 through column 13, line 25. Figures 1-5).

Ogawa teaches everything above except for the elongated (long) beam and a substrate transparent to the first laser beam having a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an inequality Ø ≥arctan (W/2d), when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W. However, Tanabe discloses a system for the formation of a silicon thin film with **(7); (8); (12); (13)....** The elongated (long) beam (see column 27, line 6); **(22); (23)** wherein each of the first laser beam and

the second laser beam is emitted from a continuous wave solid laser (see column 3, line 33). Even through, Ogawa and Tanabe do not explicitly describe the substrate transparent to the first laser beam having a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an inequality Ø ≥arctan (W/2d), when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W. However, the substrate transparent to the first laser beam having a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an inequality Ø ≥arctan (W/2d), when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W are considered to be obvious. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teaching of Ogawa (accordance with the teaching of Tanabe) since it has been held that where the general conditions of a claim are disclosed in the prior ad, discovering the optimum or workable ranges involves only routine skill in the art and it is noted that the applicant does not disclose criticality in the ranges claimed. In re Aller, 105 USPQ 233 (see MPEP 2144.05).

Additionally, since Ogawa and Tanabe are both from the same field of endeavor (semiconductors), the purpose disclosed by Tanabe would have been recognized in the pertinent art of Ogawa.

Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ogawa et al. (U.S. 6,884,699) in view of Tanabe et al. (U.S. 6,861,614) and further in view of Takami (U.S. 7,102,750).

Ogawa and Tanabe teach the above outlined features except for wherein the first direction and the second direction are orthogonal to each other. Furthermore, Takami discloses a method of in-situ monitoring of crystallization state with **(16)** wherein the first direction and the second direction are orthogonal to each other (see column 10, lines 14-17). Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Ogawa, Tanabe and Takami to adjust first direction and the second direction are orthogonal as disclosed in Takami (see column 10, lines 14-17). Additionally, since Ogawa, Tanabe and Takami are both from the same field of endeavor (semiconductors), the purpose disclosed by Takami would have been recognized in the pertinent art of Ogawa and Tanabe.

Claims 18-21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ogawa et al. (U.S. 6,884,699) in view of Takami (U.S. 7,102,750)..

Ogawa discloses a method for making a polycrystalline silicon film with

**(18)** forming a non-single crystalline semiconductor film over a substrate; irradiating the non-single crystalline semiconductor film with a first laser beam emitted from a first laser oscillator, said first laser beam is a harmonic wave of a solid laser and said first laser beam has a wavelength not longer than that of visible light, wherein an

irradiation area of the first laser beam has at least a first portion and a second portion, said first portion having a lower energy density than the second portion,_and wherein a portion of the non-single crystalline semiconductor film irradiated by the first laser beam is melted; irradiating the non-single crystalline semiconductor film with a second laser beam emitted from a second laser oscillator, said second laser beam having a fundamental wave emitted from a solid laser wherein the irradiation of the second laser beam is performed in a molten state of the non-single crystalline semiconductor film by the first laser beam, and an irradiation area of the second laser beam overlaps at least the first portion of the irradiation area of the beam; moving the substrate relatively .to the first laser beam and the second laser beam, thereby, forming a crystal grain region in the non-single crystalline semiconductor film (see column 7, line 35 through column 13, line 25. Figures 1-5).;

**(19)** forming a non-single crystalline semiconductor film over a substrate; irradiating the non-single crystalline semiconductor film with a first laser beam emitted from a first laser oscillator, said first laser beam is a harmonic wave of a solid laser and said first laser beam has a wavelength not longer than that of visible light, wherein an irradiation area of the first laser beam has at least a first portion and a second portion, said first portion having a lower energy density than the second portion, and wherein a portion of the non-single crystalline semiconductor film irradiated by the first laser beam is melted; irradiating the non-single crystalline semiconductor film with a second laser beam emitted from a second laser oscillator, said second laser beam having a fundamental wave emitted from a solid laser wherein said second laser beam is

selectively absorbed in the non-single .crystalline semiconductor film by the first laser beam, wherein an irradiation area of the second laser beam has at least a first portion and a second portion, said second portion having a higher energy density than the first portion; moving the substrate relatively to the first laser beam and the second laser beam, thereby, forming a crystal grain region in the non-single crystalline semiconductor film wherein the irradiation of the first laser beam and the second laser beam is performed in such a manner that the second portion of the irradiation area of the second laser beam overlaps at least the first portion of the irradiation area of the first laser beam (see column 7, line 35 through column 13, line 25. Figures 1-5).;

**(20)** wherein each of the first laser oscillator and the second laser oscillator is selected from the group consisting of a YAG laser (see column 7, lines 66-67).

Ogawa teaches everything above except for a molten state, a elongated beam; the substrate transparent to the first laser beam having a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an inequality Ø ≥arctan (W/2d), when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W. However, Takami discloses a method of in-situ monitoring of crystallization state with **(15); (19)...** a molten state (see column 14, lines 8-10), a elongated beam (see column 2, line 1); **(24)** wherein each of the first laser oscillator and the second laser oscillator is a continuous wave solid laser (see column 7, lines 30-33). Through, Ogawa and Takami do not explicitly describe the substrate transparent to the first laser beam having a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an

inequality Ø ≥arctan (W/2d), when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W. However, the substrate transparent to the first laser beam having a thickness d, and wherein an incidence angle Ø of the first laser beam to the surface to be irradiated satisfies an inequality Ø ≥arctan (W/2d), when a major axis of the elongated beam or a minor axis of the elongated beam is assumed to have a length of W are considered to be obvious. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teaching of Ogawa (accordance with the teaching of Takami) since it has been held held that where the general conditions of a claim are disclosed in the prior ad, discovering the optimum or workable ranges involves only routine skill in the art and it is noted that the applicant does not disclose criticality in the ranges claimed. In re Aller, 105 USPQ 233 (see MPEP 2144.05).

Additionally, since Ogawa and Takami are both from the same field of endeavor (semiconductors), the purpose disclosed by Takami would have been recognized in the pertinent art of Ogawa.

## *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chuong A. Luu whose telephone number is (571) 272-1902. The examiner can normally be reached on M-F (6:30-3:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao X. Le can be reached on (571) 272-1708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Chuong A Luu/
Primary Examiner, Art Unit 2892
November 07, 2008